

**Remarks of NASA Administrator
Daniel S. Goldin
At the
Chandra Celebration at Marshall Space Flight Center
October 15, 1999**

Art, thank you for your generous introduction. And thank you for your strong leadership here at Marshall.

Let me also thank the entire Marshall team for the incredible job you do here everyday. It your hard work and your dedication that make NASA the world's best agency—maybe the best agency in the Universe. But Chandra will have to verify that for us.

Today, I want to single out the amazing people on the Chandra team. We are here today to celebrate your accomplishments. I wish I could name every team member individually, but if I did, we'd still be here at the start of the new millennium.

There is a lot to take pride in today, but I think I am most proud of the ability of the Chandra team to stick together and overcome obstacles together. You exemplify the can-do attitude of this nation. And you have shown us that General Colin Powell is right when he says, "The best method of overcoming obstacles is the team method."

Getting Chandra from the drawing board to space was not easy, but everyone pulled together and made it happen.

The world watched in wonder as Chandra was safely deployed, and they have been even more amazed at the exciting images it is sending back to Earth.

You should all be incredibly proud that this mission is improving our understanding of the universe. The data we collect will keep scientists busy for decades, and it will inspire countless young people to pursue science careers.

I don't have to tell anyone who has worked on Chandra over the years about the obstacles you have faced and overcome. But I would like to let your colleagues here at Marshall know a little about some of the challenges you overcame to make this mission happen.

In 1991, you faced mirror fabrication problems at Hughes-Danbury Optical Systems (HDOS). This required development of a totally new metrology system—no small feat. Yet you pulled together to meet and even exceed all performance requirements. What's more, you easily met Congressionally-mandated demonstration milestones using the newly developed X-ray Calibration Facility (XRCF).

Then, in response to changes in agency and national funding constraints, the mission was restructured from a low earth orbit to the current high orbit mission. That meant a crash diet for Chandra, as its weight needed to go from 40,000 lbs. to 10,000 lbs.

Even Richard Simmons couldn't help Chandra lose that much weight. So you rolled your sleeves up and went to work.

As you developed the concepts necessary to meet that challenge, the subsystems became smaller and lighter, but much more complex. Since verification also became more complex, you had to make major changes to the observatory integration and test philosophy.

Your response? Around the clock operations by TRW with zero schedule slack for a year and a half. NASA and TRW also developed a "Badgeless" level of teamwork with extensive on-site NASA participation.

In fact, I understand that TRW was a little surprised by NASA's response to the situation. You should all be proud that you were the very first customer who worked side-by-side with them to solve problems instead of just sitting on the sidelines demanding a solution.

You came together and met the challenge once again, and the Chandra program kept moving forward. You proved yet again that the team method is the best method.

In 1999, you responded to potential parts problems, which required the removal & reworking of numerous components, including the wiring boards, programmable gate arrays, electrical assemblies, and capacitors in the power supplies.

But in all cases a conservative philosophy prevailed. You made the changes unless there was conclusive proof that no problem existed. You made safety and reliability your top priorities.

And finally, the Inertial Upper Stage (IUS) had some separation problems on a Titan flight, causing some concerns about the launch of STS-93, which would deploy Chandra. This resulted in extensive analysis & testing to isolate the cause of the difficulty. It took a lot of hard work, but you did it in time to assess and modify the IUS and ensure a safe and successful mission.

In spite of these, and several other major threats to the Chandra Program, no short cuts were ever taken in the design and development verification program. In fact, it was strengthened and a great deal of end-to-end testing was added.

Also, none of the initial performance requirements were deleted, and in some cases, such as optical resolution, they were strengthened.

So time after time, the Chandra team faced tough challenges head-on, and time-after time, you delivered.

Now you'll notice that some of today's awardees are being recognized for pointing out problems and raising concerns about mission components.

I want you to understand how important that is. Sometimes it seems easier to let a concern slide in the rush to launch or to meet a mission deadline. Usually, the moment when you ignore a concern by thinking that "nothing could possibly happen" is the moment when something does happen.

But the Chandra team remained vigilant. Everyone on the team did their very best to ensure a successful mission.

Is any of this easy? No.

Is it worth it? You bet.

Colin Powell's team method worked when he was the Chairman of the Joint Chiefs of Staff, and it worked with Chandra. And the amazing results are only beginning to come in.

One image just released on Oct. 8 revealed a hot inner core with three distinct structures around the object called Eta Carinae. It's the most luminous object known in our galaxy.

This image poses a challenge for scientists though. What astronomers saw with Chandra is just the opposite of what they thought they would see: not a point source but a bright cloud of diffuse emission.

On September 28, we released a stunning image of the spectacular remains of a stellar explosion know as the Crab Nebula. Like last week's image, this one revealed something never seen before. In this case, it was a brilliant ring around the nebula's heart.

When we combine this image with observations from the Hubble Space Telescope, we gain important clues as to how the cosmic "generator"—a pulsing neutron star—energizes the nebula, which still glows brightly almost 1,000 years after its explosion.

And an earlier image, which was used to verify instruments on Chandra, revealed previously unobserved features in the remnants of three different supernova explosions.

Two of the remnants show details of the prodigious production of energetic particles by a rapidly rotating, highly magnetized neutron star, as well as the enormous shell structures produced by the explosions.

The image of the third remnant reveals puzzling spoke-like structures in its interior.

These are truly amazing images, but they are only the beginning of years of incredible productivity for Chandra. And we have you to thank for that.

You had the intelligence and determination to stick with a dream and make it happen. And you did it as a team.

In closing, I want to salute every member of the Chandra team—NASA employees, contractors, and our partners in government, academia and industry.

I am personally proud to be involved with such an incredible team. And I am equally proud of everyone here at Marshall.

You are a shining example of the very best this nation has to offer.

Thank you.